4 REMEDIAL ACTION CONSTRUCTION ELEMENTS

All work will be conducted in strict accordance with the project plans and specifications, as approved by Ecology, which contain specific, detailed requirements to achieve the overall quality of the construction product.

The Contractor will be required to perform the following activities necessary to implement the Remedial action:

- Site preparation work at Deposit 1 and Deposit 2
- Cap placement at Deposit 1
- Excavation of Deposit 2
- Backfilling at Deposit 2
- Site closure at Deposit 1 and Deposit 2

In the following sections, the construction elements identified above are discussed in terms of:

- **Description.** Tasks related to the construction activities are described.
- **Potential Issues, Concerns, and Solutions.** Potential construction concerns, sources of information regarding potential problems, and common or anticipated remedies are described and evaluated.
- **Contaminant Monitoring, Contingency Plans, and Corrective Actions.** A plan for monitoring to be performed during remediation, required laboratory tests and their interpretation, a Quality Assurance Project Plan (QAPP), a schedule of construction monitoring tasks, a description of threshold or triggering criteria, a contingency plan that describes construction alternatives in the event of a failure (to prevent undue hazard), and an evaluation of design vulnerability and environmental risks in the event of failure.
- **Equipment, Monitoring, and Maintenance.** The equipment that will be used, as well as the monitoring and maintenance necessary to maintain equipment performance, is described.

4.1 Site Preparation Work

4.1.1 Description

The Deposit 1 staging/stockpiling area is a vacant property owned by the City of Spokane located along the south shore of the river immediately upstream of Upriver

Dam between the Spokane Police Academy and the Gonzaga Rowing Team Boathouse (Figure 3). The Contractor will clear the vacant lot of any vegetation and debris that may interfere with staging and stockpiling operations. Once cleared, the specified capping material will be delivered to the Deposit 1 staging/stockpiling area. The Contractor will provide sufficient measures within the staging/stockpiling area to prevent mixing of the capping materials while also providing adequate space for the loading of the material onto barges. The staging/stockpiling area will be sufficiently protected to resist erosion caused by wind and rain. Silt fences, ecology blocks, jersey barriers, and other items are examples of measures that may be used for environmental protection of the site and adjacent properties.

The Deposit 2 staging/stockpiling area is located on Washington State Department of Parks and Recreation property (Figure 4). This staging/stockpiling area will be made suitable for use by the Contractor by clearing any vegetation and debris less than 10 feet tall. The Contractor will take precautions to protect native vegetation, ecological habitat, and potential cultural resources in the area. The staging/stockpiling area will be sectioned to accommodate two functions. One section will be used as a staging area for delivery of the clean backfill material. The Contractor will sufficiently protect this area from environmental conditions such as wind and rain. Ecology bocks, jersey barriers, and/or rain tarps are examples of measures that could be taken for environmental protection of the site. The second section of the Deposit 2 staging/stockpiling area will be designated for the stockpiling of the contaminated sediments. This area will be enclosed by a suitable barrier (jersey barrier, ecology blocks, or a similar method) and lined along the inside of the enclosure with an impermeable liner of polypropylene or similar material to prevent water or sediment from leaving the stockpile. The excavated material from Deposits 2A and 2B will be placed within this enclosure and allowed to passively dewater prior to shipment to the disposal facility. Because of the considerable sand content of the target sediments, passive dewatering is likely to proceed relatively quickly (within 2 days), and gravity should be sufficient to dewater the sediments.

Prior to the start of construction, the staging/stockpiling areas, excavation boundaries, and access routes will be staked by the Engineer as shown on Figure 4. Erosion control devices will be placed to prevent runoff of sediment into wetlands and streams as

specified. The Contractor will confine construction activities to the minimum area necessary to complete the project within the designated boundaries. The boundaries were chosen to provide the Contractor with ample flexibility to conduct the work either from an upland route or within the water while limiting the disturbance to sensitive habitat areas, shorelines, and native vegetative communities. Temporary silt fences and/or sand dams will be placed such that the excavation areas are isolated from the larger side channel areas and from the Spokane River.

4.1.2 Potential Issues, Concerns, and Solutions

Discussions with the property tenants adjacent to the staging and stockpiling area of Deposit 1 are ongoing and have generated a few items of concern. The list below discusses these concerns and addresses the potential solutions:

- **Noise:** The Deposit 1 staging and stockpiling area is directly east of the Spokane Police Academy and the Contractor access route runs adjacent to the Academy grounds. Noise along the access route has the potential to disturb the Academy's training program. Construction is scheduled during the fall and winter, which corresponds with the Academy's least active period where the class size is the smallest.
- **Height of Equipment**: The Contractor access route also runs adjacent to the Felt's Field runway. Due to possible interference with air traffic, all construction equipment traveling on the access route must be lower than a 7:1 slope from the centerline of the runway. Figure 3 depicts the height restrictions at various locations around the site. The most restrictive height is 56 feet on the access route, which should not present difficulties for the Contractor.
- **Traffic:** In order to minimize traffic congestion and interference with Police Academy operations, the access route will divert from Waterworks Street and proceed off-road to the staging and stockpiling area at Deposit 1 (Figure 3). Some improvements will be required by the Contractor to ensure adequate road quality for transportation. All improvements will be reverted back to their approximate pre-construction condition upon completion of the work. A temporary gate will also be installed by the Contractor (Figure 3) that will circumvent the Police Academy and allow access to the site.

- **Security:** Because the construction sites at Deposit 1 and 2 are easily accessed by the public, the Contractor will construct a temporary fence around the construction site. The fence will serve both as a safety precaution for the public and security for the Contractor's equipment. Upon completion of the work, the fence will be removed and properly disposed.
- **Centennial trail:** Centennial Trail is open to the public and receives use year-round. The Contractor will utilize safety precautions such as placing flaggers on the trail during construction activities near Deposit 2 to control pedestrian traffic while allowing the trail to remain open and safe.
- **Neighborhood Traffic:** The truck and access route for Deposit 1 was intentionally chosen to remain on major streets and highways and to avoid densely populated neighborhoods. Because of its remote location, Deposit 2 work will require some construction traffic on N. Raymond road, which passes through a residential area (Figure 4). The Contractor will be required to observe all speed limits and take extra precaution in this area. N. Raymond road is approximately .25 miles long and is the most direct route to the Deposit 2 site.

4.1.3 Equipment, Monitoring, and Maintenance

The Contractor will utilize delivery trucks to bring the three layers of cap material to the Deposit 1 staging and stockpiling area. The cap, including overplacement volumes, will consist of approximately 4,700 cy of coal, 5,600 cy of base cap and 4,200 cy of gravel armor, totaling approximately 14,500 cy of material. Each truckload will carry approximately 10 cy with a 10-cy trailer attached for a maximum capacity of 20 cy; therefore, approximately 725 truck loads are anticipated for the delivery of the Deposit 1 capping material. The Contractor will also mobilize and demobilize the construction equipment along the access route. This will include the delivery of approximately 20 10-foot by 40-foot flatbed scows, a derrick, some land-based earth moving equipment, a conveyor system, and a tug boat and skiff. These items will be brought to the site by truck and loaded into the water on the bank at the staging and stockpiling area. The Deposit 1 capping is expected to take approximately 7 weeks.

At Deposit 2, approximately 600 cy of backfill material will be delivered to the staging and stockpiling area via delivery truck. Additionally, an equal volume of excavated

material will be hauled away to a disposal facility. Therefore, approximately 1,200 cy of material will be moved to or from the site, totaling approximately 60 truck trips. A front end loader will likely be used by the Contractor to excavate Deposits 2A and 2B. The material will then be moved to the staging and stockpiling area by a low ground pressure vehicle or similar vehicle and sorted by a front end loader. The Deposit 2 excavation and backfilling is expected to take 2 weeks.

4.2 Capping of Deposit 1

4.2.1 Description

The remedial project design for Deposit 1 includes placement of a clean cap system over a 3.6-acre deposit of fine-grained surface sediments contaminated with PCBs. The cap has been designed to provide an absorptive layer of coal (6 inches), overlain by a sand base cap (6 inches) and armoring gravel (3 inches) with an over-placement allowance of 6 inches for each layer, and will be constructed in a manner that minimizes turbidity and ensures accurate placement. The cap, including over-placement volumes, will consist of approximately 4,700 cy of coal, 5,600 cy of base cap and 4,200 cy of gravel armor.

Cap material will be moved from the stockpiling/staging area to a haul barge via a front end loader and a conveyor system. The haul barge will then be positioned adjacent to a derrick for material placement. The coal will be kept wetted on the barge. The material will be lowered below the water surface during placement. Placement of the coal material will be performed by a derrick from a barge using a clamshell bucket lowered through the water column to a depth of no more than 5 feet above the sediment surface prior to slowly releasing the material. The sand and gravel layer will be placed using a clamshell bucket opened at the water surface. The bucket will be opened slowly and concurrently swung from side to side. The slow release of the sand and gravel will allow the material to gently flow through the water column.

4.2.2 Potential Issues, Concerns, and Solutions

A potential construction concern associated with the Deposit 1 capping activity is the accurate placement of cap material. The approach designed to mitigate this problem is based on successful cap placement methods used at other similar sites. The Contractor will subdivide the 3.6-acre Deposit 1 cap area into approximately 60 grid areas, each

measuring approximately 50-feet by 50-feet. The Contractor will then calculate the volume or tonnage of coal and sand base cap material required to be placed in each capping grid and will monitor the delivered quantity of material. Once the target quantity of material has been placed within the grid, a piston core will be collected at a random position within the grid to verify the cap thickness. The piston core tubing will be made of a clear polycarbonate material that allows for efficient visual identification of the layers of the cap. If the minimum thickness of the cap has been achieved in that grid, then the Contractor will proceed to the next grid. If the minimum thickness of the cap layer is not obtained, then additional material will be placed throughout the grid and the sector re-verified through additional random piston coring. The volume or tonnage of cap material placed during subsequent cap placements will be adjusted based on the preceding core observations.

This general method will be used for the first two layers of the cap (coal and base cap) to ensure that the specific thicknesses are placed. Since the armor layer will prevent adequate penetration by a piston corer, a hydrographic survey will be used to verify the thickness of the final armor layer. The Contractor will conduct a survey after the base cap layer has been placed and another survey after the armor layer has been placed. The difference between the surfaces of these two contours will be used to verify the armor layer thickness.

The Contractor will also be required to complete a post-cap placement survey to verify that the minimum thickness was placed. The difference between the final grade and existing mudline (and accounting for any settlements) will be the cap thickness. In addition, the Contractor will monitor the amount of capping material placed in each area to control cap thickness. The Contractor will use an electronic positioning system to monitor and document their position.

Prior to production cap construction, the Contractor will be required to construct a Pilot Cap section. The Pilot Cap section will allow the Engineer to observe the Contractor's proposed methods of placing the cap layers as well as monitor the Contractor's methods to ensure placement quality. The Engineer will review cap placement documentation, piston core results, and post-cap bathymetry data to verify placement. If the Engineer

determines that the Contractor is not placing cap material in the correct location, the Contractor will be contacted immediately to correct the situation. Any such direction and corrective action will be documented on the next Quality Assurance Report.

4.2.3 Monitoring, Contingency Plans, and Corrective Actions

Cap thickness monitoring is described above in Section 4.2.2.

During capping activities, the Engineer will also monitor water quality. Monitoring will be performed to evaluate and document turbidity and dissolved oxygen levels during capping and to determine the need for corrective actions or procedure modifications to bring construction activities into compliance with water quality performance criteria.

Purpose and Objectives of Water Quality Monitoring. Section 401of the Clean Water Act (CWA) and State Surface Water Quality Standards (Chapter 173-201A WAC) require that construction operations shall not violate applicable effluent or water quality standards. Ecology is responsible for certifying during remedial design that such operations will comply with this requirement. This determination allows for the designation of mixing zones within which standards may be exceeded, but beyond which applicable standards must be met. While capping operations conducted as part of a MTCA remedial action do not require following the procedures for a formal Section 401 water quality certification, these operations must comply with the substantive requirements of such certification.

The Engineer will monitor water quality to verify that turbidity measurements and dissolved oxygen concentrations are maintained within water quality criteria in the vicinity of the construction activities for the following:

- Dissolved Oxygen – Concentration decreases relative to upstream conditions of less than 0.2 mg/L.
- Turbidity – Less than a 5 nephelometric turbidity unit (NTU) or 10 percent increase above upstream conditions.

Monitoring Parameters and Performance Criteria. The Spokane River is classified as class A water under WAC 173-201A, which includes a project-related dissolved oxygen decrease of less than 0.2 mg/L, and a turbidity limit of less than a 5 NTU increase over background if upstream turbidity is less than 50 NTU. If upstream background turbidity is greater than 50 NTU then a 10 percent increase in turbidity over the background reading is allowed.

As described in Section 2.2.8 of the accompanying Engineering Design Report, peak turbidity increases predicted at Deposit 1 during project capping operations are anticipated to be less than 5 NTU, and within the state surface water quality turbidity standard. These calculations reveal that if coal obtained from the Spring Creek & Decker Mines or Palmer Coking Coal is used for the Deposit 1 cap, expected construction-related turbidity increases will be below the 5 NTU increase allowed under the state water quality standards. If Elk Valley coal is used for the lower section of the Deposit 1 cap, construction-related turbidity increases could potentially and periodically exceed the 5 NTU. However, because of the conservative assumptions used, these calculations provide only an initial screening-level estimate of reasonable worst-case turbidity that may occur during construction. Turbidity monitoring will be performed during cap placement to verify water quality compliance and to determine the need for any further operational controls.

Monitoring Locations. During construction, and consistent with the requirements of WAC 173-201A, turbidity standards must normally be met at a point 150 feet downstream of the Deposit 1 remedial action area, or approximately at the Upriver Dam spillway. The background turbidity measurement will be made 300 feet upstream of the Deposit 1 remedial action area. Water quality monitoring at each location will target three depths: 1 foot below water surface, at mid-depth and 1 foot above mudline. Routine ambient monitoring activities will be performed at these locations on two occasions immediately prior to the beginning of construction (to establish baseline water quality conditions), and while construction is in progress.

Monitoring Schedule. Water quality monitoring will be performed according to three schedules:

- **Intensive Monitoring** – twice per construction shift. Intensive monitoring will be initiated at the start of the construction phase and upon exceedance of water quality performance criteria at the compliance boundary. Intensive monitoring will continue for a period of 2 days following startup. If performance criteria have not been exceeded at the water quality compliance boundary within the 2-day startup period, then monitoring will continue at the routine frequency.
- **Routine Monitoring** – once daily. Routine monitoring will continue for an additional 5 days. If performance criteria have not been exceeded at the water quality compliance boundary during the 5-day period, then monitoring will continue at the limited frequency at the direction of the Engineer and approval of Ecology.
- **Limited Monitoring** – once weekly.

Operational Modifications if Out of Compliance. If exceedance of water quality criteria occurs at the compliance boundary, as defined above, the Contractor will be required to modify operations. Construction activities will also cease at the first indication of significant oil sheen and/or distressed or dying fish in the vicinity. In this event, Ecology will be notified immediately. Modifications may include slowing of construction activities, modifying placement techniques, deploying silt curtains or booms, or other operational modifications.

4.2.4 Description of Equipment, Monitoring, and Maintenance

Capping equipment will consist of a conveyor and front end loader on shore near the staging and stockpiling area that will load the capping material onto a haul scow barge. A tug or contractor's skiff will then maneuver the scow from the docking position at the staging/stockpiling area into position at Deposit 1. A derrick will also be maneuvered into place by the tug and anchored into position then unload the capping material from the scow. Bathymetric surveys and piston coring will be conducted to verify cap placement using a skiff or survey boat.

In accordance with the contract terms, the equipment will be maintained by the Contractor in good working order and in safe working condition at all times. Survey equipment will be maintained and calibrated for the life of the contract. Calibration

techniques are prescribed to ensure that the equipment performs to the accuracy required by the specified Survey Order as defined in Standard Hydrographic Survey Manuals. Barge conditions will be monitored and maintained throughout capping activities. The Contractor will be instructed to correct any deficiencies.

4.3 Excavation and Backfill of Deposit 2

4.3.1 Description

Deposits 2A and 2B in the Donkey Island area will be excavated to remove the approximate extents of the PCB contamination. This will result in a total removal of approximately 600 cy of sediment. Conventional upland excavation equipment such as track hoes or excavators will be used for the removal action. The excavation will likely be conducted in the water and from the northern bank of Deposit 2A. At Deposit 2B, excavation will be conducted solely from the northern bank near the deposit or from the water. The excavated material will be placed in an earthmover (such as a low ground pressure front end loader) and moved to the Deposit 2 staging/stockpiling area for passive dewatering and then transportation to an approved disposal facility.

Clean sand material meeting specifications will be purchased from a regional supplier and delivered to the Deposit 2 staging/stockpiling area for use as backfill. Once the excavation of the contaminated material is complete, an earthmover will transport the clean sand to the Deposit 2 site where it will be placed by the excavator. Upon completion of the backfill, the deposit and excavation area will be restored by the Contractor to its approximate pre-excavation condition in order to preserve the shoreline and river riparian/backwater habitat surrounding Deposit 2.

4.3.2 Potential Issues, Concerns, and Solutions

The main concerns associated with Deposit 2 work are excavating to the required extents, containing turbidity, and avoiding damage to the surrounding environment and cultural resources. Each of these items is discussed below:

Excavating to the required extents and depths. Suitable pre-excavation surveys were completed by the Engineer in April 2006 to determine the starting elevation of Deposits 2A and 2B prior to construction activities. Thus, there is no need for the Contractor to

perform an additional baseline survey. Once excavation has been completed to the specified elevations, a post-excavation survey will be conducted by the Engineer to demonstrate that the specified elevation has been reached. Should the excavated surface not reach the designed elevation, additional excavation will be required.

Surface (0 to 10 cm below mudline) sediment samples will be collected at four stations within the Deposit 2 boundaries: Station 100, 102, 104, and 107. After collection of the samples and verification by the Engineer that the final elevation has been attained, backfill material will be placed. The collected surface sediment samples will be analyzed for total solids and Total PCBs. Unavoidable sediment residuals exceeding the cleanup level may possibly remain within the excavation areas, which may be documented by the post-excavation sampling data. The post-excavation sampling results will be used to determine the need for post-backfill/cap monitoring. That is, if all four post-excavation surface sediment samples contain Total PCB concentrations at or below 62 μg/Kg dw, no post-excavation monitoring will be required in Deposit 2. However, if any of the four post-excavation surface sediment samples contain Total PCB concentrations above 62 μg/Kg dw, long-term monitoring of the backfill/cap surface will be performed to assess the performance of the cap. In this situation, monitoring will be performed during Years 2 and 4 following completion of the remedial action, as generally described in the accompanying Operations, Maintenance, and Monitoring Plan (OMMP), to be described in more detail in an OMMP Addendum submitted to Ecology for review.

A measurement will be made between the two surfaces (pre- and post-excavation elevation) to calculate total volume of material excavated to be used for pay purposes, as well as the required volume of backfill material needed to return the site to the pre-excavation elevation. Once the required backfill material has been placed, a final survey will be conducted to verify the extent of the backfill material. If the final surface is below the specified elevation, additional backfill material will be placed.

Containing turbidity. Water quality monitoring will not be required during construction at Deposit 2. However, due to the ecological diversity and sensitive nature of the area surrounding Deposit 2, turbidity control measures will be required when

conducting construction activities at either Deposit 2A or 2B. The Contractor will place silt curtains, sandbags, or a similar turbidity control measure approved by Ecology in the channel within 50 feet of the extents of the deposits. The turbidity control measures will minimize the water quality impact during construction. Once the turbidity control measures are in place, the Engineer will seine the contained area for fish and other aquatic species.

Avoiding damage to surrounding environment. The Contractor will submit a plan for approval by Ecology that details the most efficient routes and means of excavation to complete the work at Deposit 2 in accordance with the specifications and taking into consideration the sensitive nature of the habitat, cultural resources, and the surrounding topography. Restrictive areas and clearing limits will be delineated on the final construction drawings to indicate areas that the Contractor must avoid, as well as areas where only limited activities may take place. Upon completion of the work, all areas in the vicinity of Deposit 2 used by the Contractor will be restored to their approximate pre-excavation condition in order to preserve the shoreline and river riparian/backwater habitat.

4.3.3 Monitoring, Contingency Plans, and Corrective Actions

During excavation and backfill of Deposit 2, the Engineer will perform visual examination of sediment conditions (i.e., T probe polling) during two conditions: post-excavation and post-backfill placement. The purpose of the post-excavation sediment polling and visual/photographic documentation is to confirm that fine-grained sediments in Deposits 2A and 2B have been removed to the extent practicable, allowing for unavoidable excavation residuals. Limited polling will also take place upon completion of backfilling to verify that backfill material is placed in a manner that minimizes mixing with underlying sediments. Depending on the field observations and polling results, corrective actions could include additional removal of sediment material or placement of additional backfill material.

Two topographic surveys will also be performed by the Engineer: one after excavation and another after backfilling. Traditional upland techniques will be used for the surveys

as the water in the channel near Deposit 2 is relatively shallow. These surveys will be used to measurement and payment at Deposit 2.

4.3.4 Description of Equipment, Monitoring, and Maintenance

Equipment used for the excavation of Deposits 2A and 2B will include hydraulic excavation equipment such as track hoes, back hoes, loaders, and a low ground pressure haul vehicle. Surveys will also be conducted by the Engineer after excavation and after backfilling of Deposit 2 utilizing traditional upland survey techniques.

A staging and stockpiling area will be constructed by the Contractor within the designated area and in accordance with the specifications. Environmental controls will be required to prevent erosion of the material from natural forces such as rain and wind. The area designated for staging operations will be surrounded by an earthen berm or retaining wall made of cement ecology blocks and will only be used for staging of delivered clean backfill material. The stockpiling area will be constructed separate from the staging area and will be lined to minimize draining of water (or sediment) out of the stockpiling area. All contaminated material will be transported to an approved disposal facility. Any drainage water at the stockpiling area will be collected in a sump and discharged back to the Deposit 2 area. Before the water enters the sump, the water will be filtered of fines using hay bales, filter fabric, rock, or an equivalent filter.

The Contractor will conduct regular inspections and maintenance of the staging and stockpiling area to ensure compliance with its intended purpose. Any leaks, spills, or release of contaminated material outside of the stockpiling area will be immediately contained, cleaned up, and reported to the Engineer and Ecology.